

# Determining fire affected areas in near real-time using MODIS Corrected Reflectance 7-2-1 Imagery using Worldview:

By LANCE // ESDSWG-data recipe group, February 2015

## Objective:

As part of the LANCE American Customer Satisfaction Index (ACSI) survey we were asked to provide near real-time information on burned area. The standard MODIS burned area products [MCD45] are not available in near real-time (find out more about the MODIS burned area products at: <http://modis-fire.umd.edu/pages/BurnedArea/BurnedArea.html>).

The following description uses Worldview to show how MODIS Bands 7-2-1 Corrected Reflectance imagery can be viewed in combination with the active fire data to identify fire-affected areas that are characterized by deposits of charcoal and ash, removal of vegetation and/or alteration of vegetation structure. This technique only works in certain biomes and with fires above a minimum size.

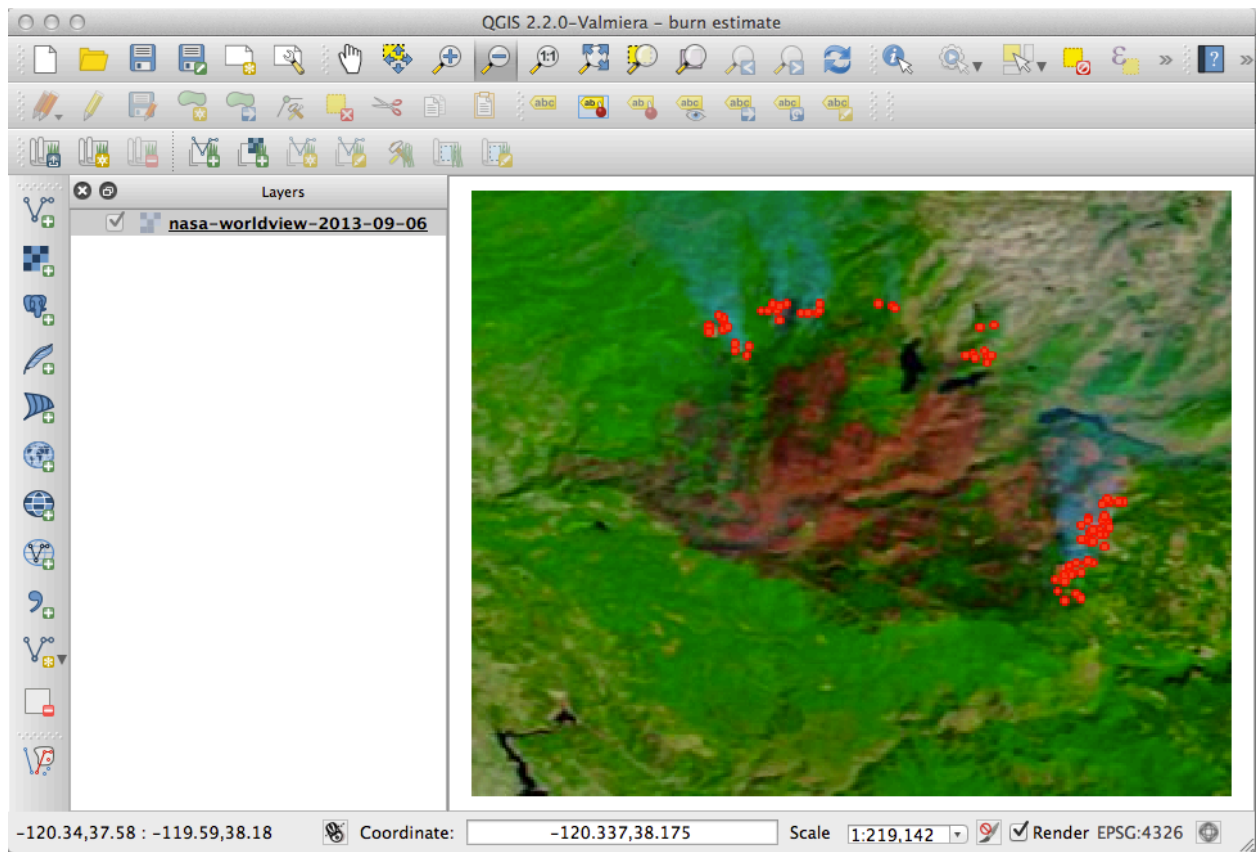
The following example uses Worldview to overlay MODIS hotspot / active fire data on MODIS Bands 7-2-1 Corrected Reflectance imagery to identify burned areas. From Worldview users can download a “snapshot” of the image in GeoTIFF, JPEG, PNG or KMZ format.

Not included in this recipe: Depending on the software used these “snapshot” images can be imported in to a GIS layer and be viewed with other relevant geospatial layers. Users could even calculate the approximate size of the burned area.

**Limitations:** This “recipe” is meant for timely applications that require a quick assessment of burned area. The method relies on visual interpretation and does not provide a robust or systematic means of determining burned areas. This method will not work if the area affected by fire is not big enough, or hot enough to burn and remove the vegetation or alter the vegetation structure. Under the right conditions it can provide a quick assessment of area burned as this example shows.

## Keywords: Worldview, Burned Area

Figure 1: This shows a “snapshot” downloaded from Worldview and imported in to QGIS. The base layer is Corrected Reflectance Terra/MODIS Imagery (bands 7-2-1) with Fires and Thermal Anomalies (Day and Night) from Terra and Aqua / MODIS overlaid (show as red points). In this example reddish-brown pixels show the area burned.



## What was used:

- Worldview (<http://earthdata.nasa.gov/worldview>)
- Contact information ([support@earthdata.nasa.gov](mailto:support@earthdata.nasa.gov))
- QGIS ([www.qgis.org](http://www.qgis.org))

## Estimated Time to Complete:

Approximately 30 minutes

## Procedure:

### Step 1: Open Worldview and explore the progression of the fire and burned area.

This example is for the California Rim fire, which started on 17<sup>th</sup> August 2013. Either go directly to the permalink <http://1.usa.gov/198Aqly> and then to step 1.3, or follow the following instructions:

- 1.1 Open Worldview <http://earthdata.nasa.gov/worldview> and navigate to southern California. The approximate coordinates are 37°50'N and 120°00'W. Figure 2 and 3 show the approximate location of the Rim Fire. [Change the date to 26 August

2013 and turn on the Fire and Thermal Anomalies for Terra/MODIS. You should see the Rim Fire].

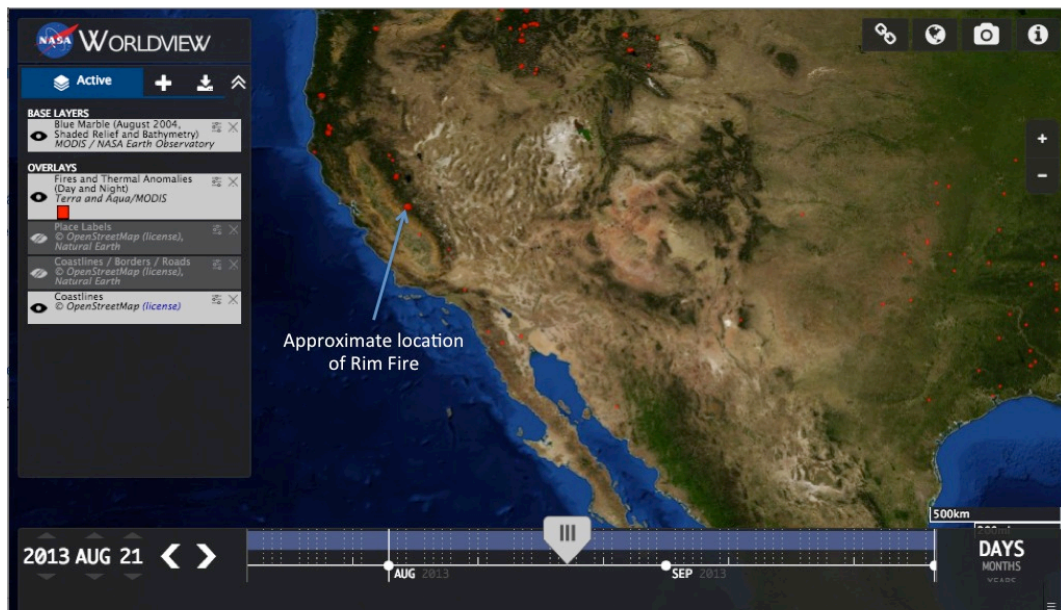


Figure 2. Approximate location of California Rim Fire.

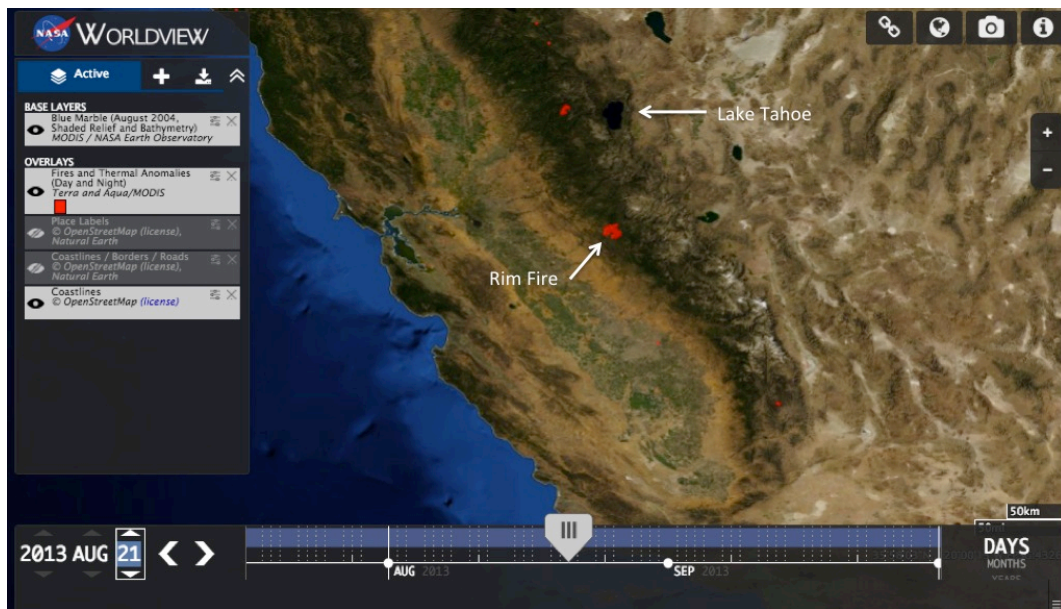


Figure 3. Approximate location of California Rim Fire (2).

1.2 Turn on (+Add Layers) the following layers:

- BASE LAYERS Corrected Reflectance (7-2-1) Terra/MODIS and
- OVERLAYS Fires and Thermal Anomalies (Day and Night) Terra/MODIS



- Change the date back to August 16<sup>th</sup> 2013 to see the image prior to the start of the Rim fire.

(Alternatively, open Worldview using the following permalink <http://1.usa.gov/198Aqly>).

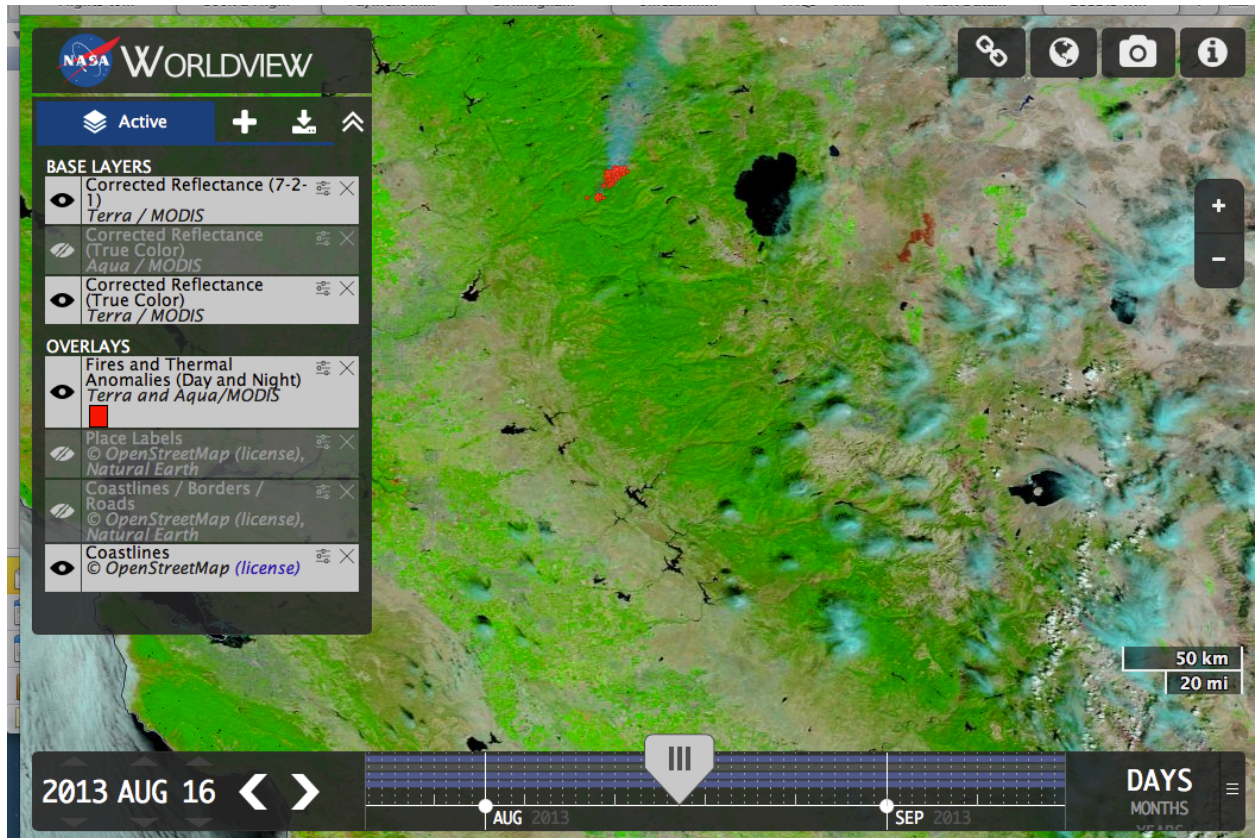


Figure 4, Screenshot from Worldview showing Corrected Reflectance Terra/MODIS Imagery (bands 7,2,1) from 16<sup>th</sup> August 2013 (before the of the California Rim Fire started).

### 1.3 Scroll through changing the date incrementally.

You should see the fire start on the 17th August. By the 20<sup>th</sup> August 2013 you should be able to see the fire scar [see: <http://1.usa.gov/187YJz0>] and by 26<sup>th</sup> August 2013 [<http://1.usa.gov/1GBjim9>] the fire affected area is visible in reddish brown color (see Figure 5)

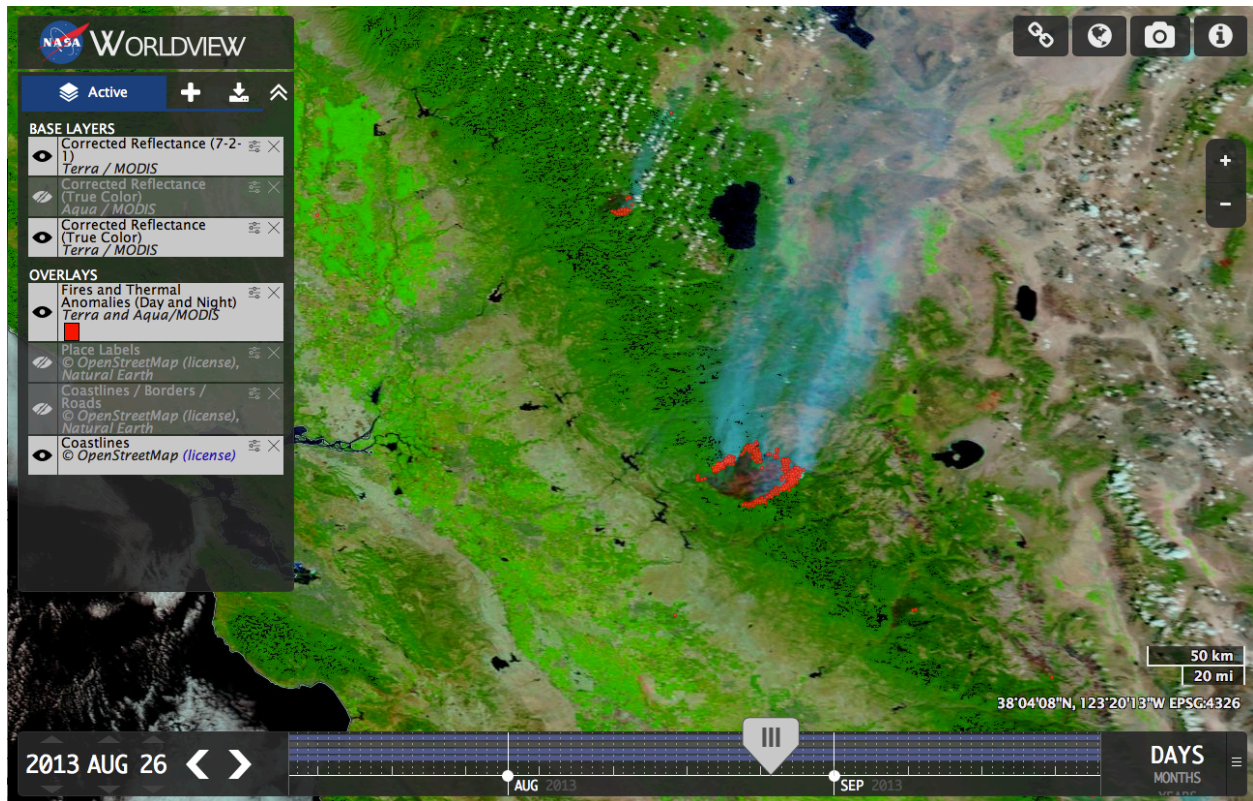


Figure 5, Screenshot from Worldview showing Corrected Reflectance Terra/MODIS Imagery (bands 7,2,1) from 26<sup>th</sup> August 2013. Smoke and MODIS hotspots (probably active fires), shown as red points, are visible south of Lake Tahoe.

## Step 2: Create a GeoTIFF image

- 2.1 Click on the camera icon (top right menu)
- 2.2 Select the area for download. Set the “snapshot” format to GeoTIFF and set the resolution to 250m, then click on Download.



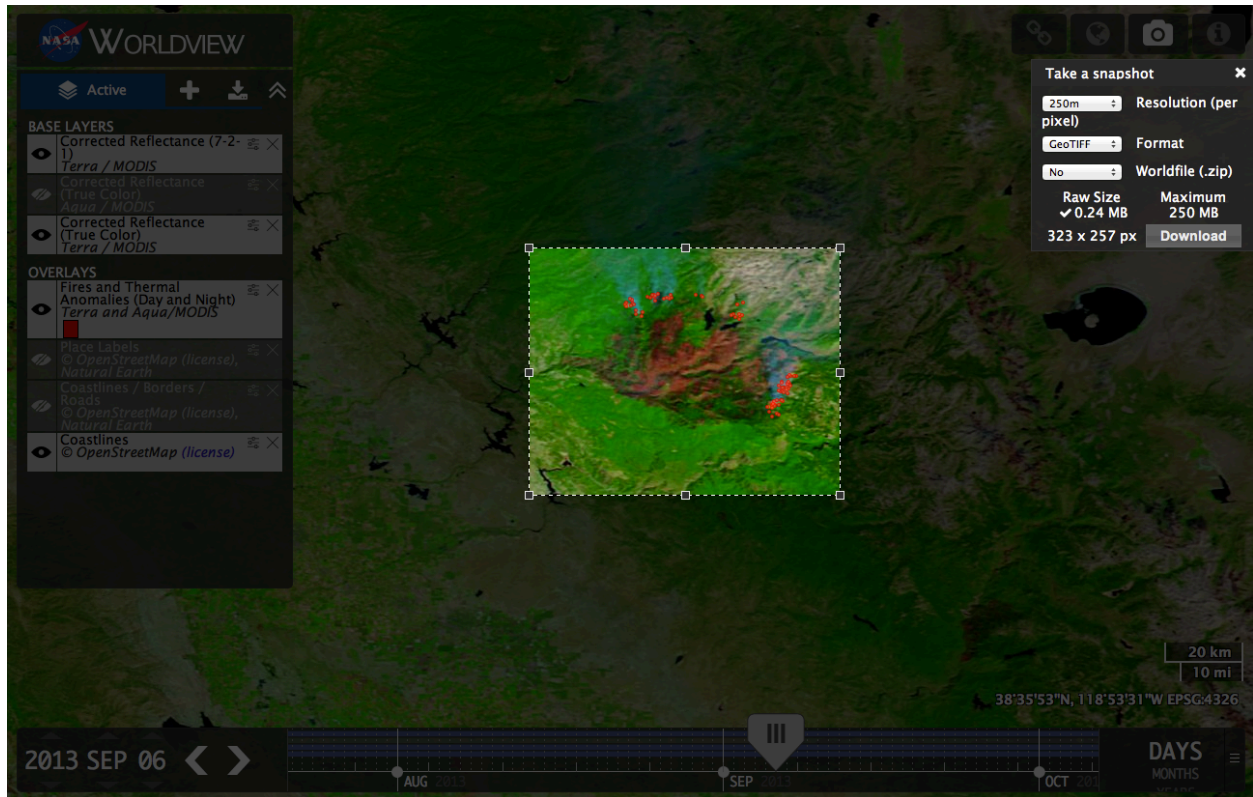


Figure 4. Downloading a 250m resolution GeoTIFF snapshot from Worldview.

### Additional Information:

- Information on the standard MODIS burned areas can be found at: <http://modis-fire.umd.edu/pages/BurnedArea/BurnedArea.html>.